Answers to All Exercises

LESSON 3.1

1a. 15

1b. -16

1c. -5

2a.

Figure number	Perimeter
1	5
2	8
3	11
4	14
5	17

2b. 5 ENTER, Ans + 3 ENTER, ENTER, . . .

2c. 32

2d. Figure 15

3. $-14.2, -10.5, -6.8, -3.1, 0.6, 4.3$

4a. Start with 3, then apply the rule Ans + 6; 10th term = 57.

4b. Start with 1.7, then apply the rule Ans $-$ 0.5; 10th term = -2.8.

4c. Start with -3, then apply the rule Ans $\cdot -2$; 10th term = 1536.

4d. Start with 384, then apply the rule Ans/2 or Ans $\cdot$ 0.5; 10th term = 0.75.

5a. The recursive routine is 0 ENTER and then Ans + 12.35 ENTER. The starting value is 0, the height of ground level (the first floor). Add the average floor height for the next 85 floors: 12.35 ft.

5b. The recursive routine is 1050 ENTER and then Ans + 10.875 ENTER. The starting value is the height of the 86th floor. Add 10.875, the average floor height of floors 86 through 101.

5c. When you are 531 ft high, you are 43 floors up and thus on the 44th floor.

5d. 1093.5 ft; 94th floor

6a. Possible explanation: The smallest square has an area of 1. The next larger white square has an area of 4, which is 3 more than the smallest square. The next larger gray square has an area of 9, which is 5 more than the 4-unit white square.

6b. The recursive routine is 1 ENTER, Ans + 2 ENTER, ENTER, and so on.

6c. 17, the value of the 9th term in the sequence

6d. 39

6e. The 48th term is 95; students might press ENTER 48 times or compute $2(48) - 1$.

7a. The table for six figures of the L-shaped puzzle pieces is

Figure	Toothpicks	Perimeter	Area
1	8	8	3
2	14	12	6
3	20	16	9
4	26	20	12
5	32	24	15
6	38	28	18

7b. To find the number of toothpicks, press 8 ENTER and then Ans + 6 ENTER. To find the perimeter, press 8 ENTER and then Ans + 4 ENTER. For the area, press 3 ENTER and then Ans + 3 ENTER.

7c. Figure 10 has 62 toothpicks, a perimeter of 44, and an area of 30.

7d. Figure 25, made from 152 toothpicks, has a perimeter of 104 and an area of 75.

8a. 4 m

8b. Press 101 ENTER and then Ans $-$ 4 ENTER. The 19th term represents the height of the 7th floor. The height is 29 m.

8c. 26 terms

8d. 19 m

9a. One routine is press -16 ENTER and then Ans + 12 ENTER. Another is press 2 ENTER and then Ans $\cdot -2$ ENTER.

9b. Two possible sequences are $\{-16, -4, 8, 20, 32, 44, 56, \ldots\}$ and $\{2, -4, 8, -16, 32, -64, 128, \ldots\}$.

9c. More numbers are needed to uniquely determine a recursive routine.

10a. $17 \cdot 7$, or 119

10b. 14

10c. Possible answer: There are 14 multiples between 100 and 200. There are also 14 multiples of 7 between 200 and 300, but there are 15 between 300 and 400.

10d. Possible answer: The 4th multiple of 7 is $4 \cdot 7$, or 28; the 5th multiple of 7 is $5 \cdot 7$, or 35; and so on. Recursively, you start with 7 and then continue adding 7.

11a. Press 6.8 ENTER and then Ans + 1.5 ENTER, ENTER . . . .

11b. Press 7.2 ENTER, and then Ans + 1.5 ENTER, ENTER . . . .

11c. The starting terms differ; the rule itself is the same.

11d. See below.

11e. Each baby always increases by 1.5 lb, and the difference between the babies' weights is always 0.4 lb; the starting values are different.

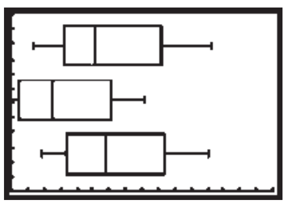
12a. Press 1 ENTER, Ans · 3 ENTER, ENTER . . . ; the 9th term is 6561.

12b. Press 5 ENTER, Ans · (−1) ENTER, ENTER . . . ; the 123rd term is 5.

12c. Press −16.2 ENTER, Ans + 1.4 ENTER, ENTER . . . ; the 13th term is the first positive term.

12d. Press −1 ENTER, Ans · (−2) ENTER, ENTER . . . ; the 8th term, 128, is the first to be greater than 100.

13a. The top box plot is Portland, the middle is San Francisco, and the bottom is Seattle.



[0, 7, 0.5, 0, 12, 1]

San Francisco has the least precipitation and is the only city in which there is a month with no precipitation. One indicator that the weather is much drier in San Francisco is that the month with no precipitation is not an outlier.

13b. You lose information about what time of year is wettest; a bar graph or scatter plot would show trends over the months of the year more clearly.

14. $x = -2.6$

Equation: $8 + 3(x - 5) = -14.8$

Description	Undo	Result
Pick x.		−2.6
−(5)	+(5)	−7.6
·(3)	/(3)	−22.8
+(8)	−(8)	−14.8

11d. (*Lesson 3.1*)

Age (mo)	0	1	2	3	4	5	6
Weight of Baby A (lb)	6.8	8.3	9.8	11.3	12.8	14.3	15.8
Weight of Baby B (lb)	7.2	8.7	10.2	11.7	13.2	14.7	16.2

LESSON 3.2

1a. negative; -1517

1b. positive; 472

1c. positive; $12.\overline{3}$

1d. positive; 326

1e. negative; $-3.\overline{3}$

1f. negative; -1464

2a. $\{0.5, 1, 1.5, 2, 2.5, 3\}$; 0.5, Ans + 0.5

2b. $\{4, 3, 2, 1, 0\}$; 4, Ans − 1

2c. $\{-1, -0.75, -0.5, -0.25, 0, 0.25\}$; −1, Ans + 0.25

2d. $\{-1.5, 0, 1.5, 3\}$; −1.5, Ans + 1.5

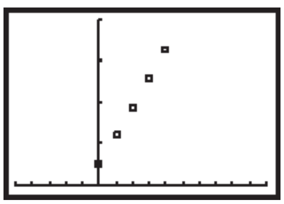
3. **2b.**

x	y
0	4
1	3
2	2
3	1
4	0

2d.

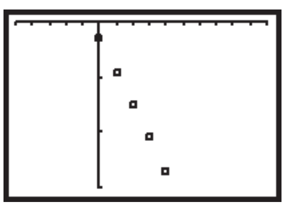
x	y
0	−1.5
1	0
2	1.5
3	3

4a.



[−5, 10, 1, 0, 40, 10]

4b.



[−5, 10, 1, 0, −30, 10]

4c. the y-axis; 0

4d. In 4a, the y-coordinates increase by 7. In 4b, the y-coordinates decrease by 6.

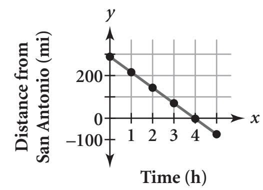
5a. {0, 0} ENTER, {Ans(1) + 1, Ans(2) + 2.54}

5b.

Inches	Centimeters
0	0
1	2.54
2	5.08
14	35.56
17	43.18

6a. {0, 272} ENTER, {Ans(1) + 1, Ans(2) − 68} ENTER, ENTER, ENTER, ENTER, ENTER

6b and 6e.



6c. The starting value is the point (0, 272) on the graph.

6d. On the graph, you move right 1 unit and down 68 units to get from one point to the next. In the recursive routine, you add 1 to the first number and subtract 68 from the second number.

6e. This is a linear graph relating a distance to any time between 0 and 5 h. The line represents the distances at all possible times; points represent distances only at certain times.

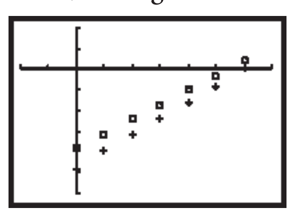
6f. The car is within 100 mi of San Antonio after 2.53 h have elapsed. Explanations will vary. Graphically, it is the time after which the line crosses the horizontal line $y = 100$.

6g. The car takes 4 h to reach San Antonio. Answers will vary. The answer is the fourth entry in the table. Graphically, it is where the line crosses the x-axis.

7a. Possible answer: {1, 1.38} ENTER, {Ans(1) + 1, Ans(2) + 0.36} ENTER, ENTER, ... The recursive routine keeps track of time and cost for each minute. Apply the routine until you get {7, 3.54}. A 7 min call costs $3.54.

7b. Possible answer: The graph should consist of points that lie on a line. It should include the point (1, 1.38). Each subsequent point should be 1 unit to the right and $0.36 higher than the point before it.

8a.



[−10, 35, 5, −60, 20, 10]

8b. The points for each submarine appear to lie on a line; the USS *Dallas* surfaces at a faster rate.

8c. Yes; each line means that any time in this range corresponds to depth below the surface.

8d. The submarine's nose rises slightly above the water when surfacing.

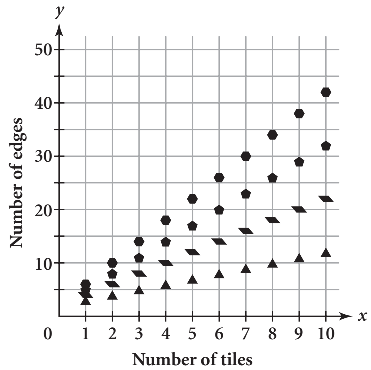
9a. See below.

9b. Number of tiles: The starting value is 1; the rule is add 1.

Triangle: The starting value is 3; the rule is add 1.
Rhombus: The starting value is 4; the rule is add 2.
Pentagon: The starting value is 5; the rule is add 3.
Hexagon: The starting value is 6; the rule is add 4.
To generate the sequences for all tiles simultaneously, enter {1, 3, 4, 5, 6} and {Ans(1) + 1, Ans(2) + 1, Ans(3) + 2, Ans(4) + 3, Ans(5) + 4}.

9c. triangle: 52; rhombus: 102; pentagon: 152; hexagon: 202

9d.

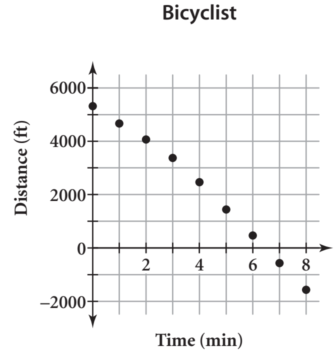


9e. The points of each graph appear to lie on a line, and each graph starts at 1; the graphs increase in steepness from the triangle tile to the hexagon tile.

9f. No; there must be a whole number of tiles and a whole number of edges.

10a. Answers will vary. The graph starts at (0, 5280). The points (0, 5280), (1, 4680), (2, 4080), and (3, 3480) will appear to lie on a line. From (3, 3480) to (8, −1520), the points will appear to lie on a steeper line. The bicyclist ends up 1520 ft past you.

10b.



10c. Sample answer: What place on the graph shows when the bicyclist passes you? The answer is on the x-axis between 6 and 7 min.

11a. $13.9\overline{3}$

11b. $x = 3.4$

Operations	Undo operations	Results
		$x = 3.4$
− (2.8)	+ (2.8)	0.6
· (3.2)	/ (3.2)	1.92
+ (5.4)	− (5.4)	7.32
/ (1.2)	· (1.2)	6.1
− (2.3)	+ (2.3)	3.8

12a. $\dfrac{9(C + 40)}{5} - 40$

12b. Add 40, multiply by 5, divide by 9, then subtract 40.

12c. $\dfrac{5(F + 40)}{9} - 40$

13a. 0.118, about $\frac{1}{8}$ L water; 170.25, about 170 g flour

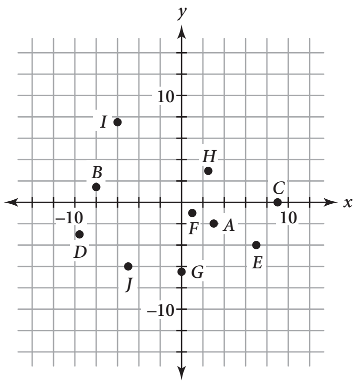
13b. $218.\overline{3}$, or about 220°C

9a. (*Lesson 3.2*)

Tile Edges on the Perimeter

Number of tiles	Triangle	Rhombus	Pentagon	Hexagon
1	3	4	5	6
2	4	6	8	10
3	5	8	11	14
4 ⋮	6	10	14	18
10	12	22	32	42

14a.



14b. Quad I: *H*; Quad II: *B, I*; Quad III: *D, J*; Quad IV: *A, E, F*; *x*-axis: *C*; *y*-axis: *G*

14c. Sample answer: If the coordinates are both 0, then the point is on the origin. If the *x*-coordinate is 0, then the point is on the *y*-axis. If the *y*-coordinate is 0, then the point is on the *x*-axis.

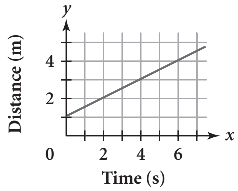
If the first coordinate is positive, then the point will be in Quadrant I or IV. To tell which quadrant, look at the *y*-coordinate. If the *y*-coordinate is positive, the point is in Quadrant I. If the *y*-coordinate is negative, the point is in Quadrant IV.

If the first coordinate is negative, then the point will be in Quadrant II or III. To tell which quadrant, look at the *y*-coordinate. If the *y*-coordinate is positive, the point is in Quadrant II. If the *y*-coordinate is negative, the point is in Quadrant III.

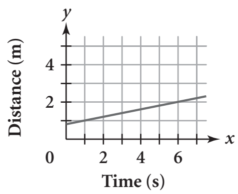
LESSON 3.3

1. $\{0, 4.0\}$ and $\{\text{Ans}(1) + 1, \text{Ans}(2) - 0.4\}$

2.



3. Start at the 0.8 m mark and walk away from the sensor at a constant rate of 0.2 m/s.



4a. The walker starts 2.5 m away from the motion sensor and walks toward it very slowly at a rate of 1 m in 6 s.

4b. The walker starts 1 m away from the motion sensor and walks away from it at a rate of 2.5 m in 6 s.

5a. The walker starts 6 m away from the motion sensor and walks toward it at a rate of 0.2 m/s for 6 s.

5b. The walker starts 1 m away from the motion sensor and walks away from it at a rate of 0.6 m/s for 6 s.

6. The first graph, which shows a line, because the walk is a continuous process; the walker is somewhere at every possible time in the 6 s.

7. Convert 1 mi/h to ft/s:

$$\frac{1\text{ mi}}{1\text{ h}} \cdot \frac{1\text{ h}}{60\text{ min}} \cdot \frac{1\text{ min}}{60\text{ s}} \cdot \frac{5280\text{ ft}}{1\text{ mi}} = 1.4\overline{6}\text{ ft/s}$$

8a. 4 s

8b. Away; the distance is increasing.

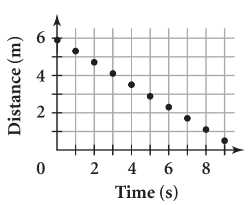
8c. approximately 0.5 m

8d. $\dfrac{2.9 - 0.5}{4} = 0.6$ m/s

8e. $\dfrac{5.5\text{ m}}{0.6\text{ m/s}} = 9.1\overline{6}$ s, or approximately 9 s

8f. The graph is a straight line.

9.



10a. The rate is negative, so the line slopes down to the right.

10b. The rate is neither negative nor positive, it is zero, so the line is horizontal.

10c. The line is not very steep.

11a. ii

11b. iv

11c. iii

11d. i

12. Start walking at the 0 mark when the sensor starts and walk 1 ft every second. Start walking at the 0 mark when the sensor starts and walk 1 m every second. 1 m/s is a faster rate, because more distance is covered per second.

13a. Not possible; the walker would have to be at more than one distance from the sensor at the 3 s mark.

13b. Possible; the walker simply stands still about 2.5 m from the sensor.

13c. Not possible; the walker can't be in two places at any given time.

14a. $x = \dfrac{21}{5}$, or 4.2

14b. $x = \dfrac{22}{9}$, or $2.\overline{4}$

14c. $x = \dfrac{cd}{e}$

15a. $\dfrac{24{,}901.55\text{ mi}}{(2 \cdot 365 + 2 \cdot 30.4 + 2)\text{ days}} \approx 31.4$ mi/day

15b. $\dfrac{31.4\text{ mi}}{1\text{ day}} \cdot \dfrac{(1.5 \cdot 365)\text{ days}}{1} \approx 17{,}191.5$ mi

15c. $\dfrac{31.4\text{ mi}}{1\text{ day}} = \dfrac{60{,}000\text{ mi}}{t}$;

$t \approx 1{,}911$ days, or more than 5 yr

16a. ~ 13 mi/gal or 0.077 gal/mi

16b. 65 mi

16c. 7.7 gal

Answers to All Exercises

LESSON 3.4

1a. ii

1b. iv

1c. iii

1d. i

2a. $t \approx 0.18$ h

2b. $t \approx 0.47$ h

2c. 24 represents the initial number of miles the driver is from his or her destination.

2d. 45 means the driver is driving at a speed of 45 mi/h.

2e. $t = \frac{8}{45}$, or $0.1\overline{7}$

3a. $d \approx 38.3$ ft

3b. $d \approx 25.42$ ft

3c. The walker started 4.7 ft away from the motion sensor.

3d. The walker was walking at a rate of 2.8 ft/s.

4a. $x \approx 7.267$

4b. $x = 11.2$

5a. $35 + 0.8(25) = 55$ mi

5b. 50 min; students might use a graph or the undo method.

6a. Louis has burned 400 calories before beginning to run. His calorie-burning rate is 20.7 calories per minute, and he wants to burn 700 total calories.

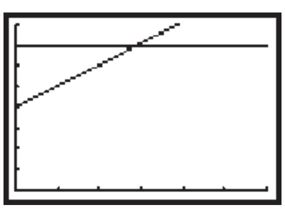
6b. 400 ENTER, Ans + 20.7 ENTER

6c. $Y_1 = 400 + 20.7x$

6d. 700 ENTER, Ans + 0 ENTER

6e. $Y_2 = 700 + 0x$ or $Y_2 = 700$

6f. The y-intercept of Y_1, which is 400, is the number of calories burned after 0 min of running (before Louis begins to run).



[0, 30, 5, 0, 800, 100]

6g. The approximate coordinates of the point where the lines meet are (14.5, 700). This means that after 14.5 min of running, Louis will have burned off his desired total of 700 calories.

7a. One possible scenario: Jo has an initial start-up cost of $300 for equipment and expenses. She makes $15 for every lawn she mows, N.

7b. Sample questions: How many lawns will Jo have to mow to break even? [Solve the equation $-300 + 15N = 0$; Jo must mow 20 lawns.] How much profit will Jo earn if she mows 40 lawns? [Substitute 40 for N; $300.]

7c. $N = \frac{(P + 300)}{15}$

7d. It tells you the number of lawns you have to mow to make a certain amount of profit.

8a. $s = 5 + 9.8t$ or $s = 9.8t + 5$

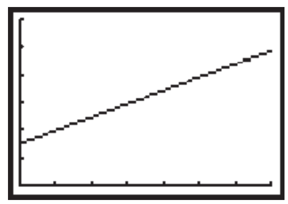
8b. 34.4 m/s

8c. 8 s

8d. It doesn't account for air resistance and terminal speed.

9a. $y = 45 + 0.12x$, where x represents dollar amounts customers spend and y represents Manny's daily income in dollars

9b.



[0, 840, 120, 0, 180, 30]

9c. $45 + 0.12 \cdot 312 = \$82.44$

9d. between $500 and $625

10a. $y = 114 + 6.9x$

10b. $y = 207 + 7.3x$

10c. $y = 160.5 + 11.3x$

10d. Monday: 321 calories; Wednesday: 426 calories; Friday: 499.5 calories

11. Partial answer: Write the percent as one ratio of a proportion. Put the part over the whole in the othe ratio.

11a. $\frac{8}{n} = \frac{15}{100}$, $n \approx 53.3$

11b. $\frac{15}{100} = \frac{n}{18.95}$, $n \approx 2.8$

11c. $\frac{p}{100} = \frac{326}{64}$, $p \approx 509.4$

11d. $\frac{10}{100} = \frac{40}{n}$, $n = 400$

12a. Carl's Purchases

Miles traveled	Gallons	$\frac{\text{miles}}{\text{gallon}}$
363	16.2	22.4
342	15.1	22.6
285	12.9	22.1

12b. 22.4 mi/gal

12c. 383 mi

12d. approximately 189 gal

13. Sample explanation: I matched the rate of change to each graph. I assumed the starting value was the y-intercept.

13a. ii

13b. iv

13c. iii

13d. i

14a. 14 m/s

14b.

Time (s)	Distance (m)
1	14
2	28
3	42
4	56
5	70
6	84
7	98
8	112
9	126
10	140

14c. {0,0} ENTER, {Ans(1) + 1, Ans(2) + 14} ENTER

14d. The points lie on a line.

14e. 50,400 m, or 50.4 km

15a. The expression equals −4.

Ans − 8	−3
Ans · 4	−12
Ans/3	−4

15b. $y = 14$

Answers to All Exercises

LESSON 3.5

1a.

Input x	Output y
20	100
-30	-25
16	90
15	87.5
-12.5	18.75

1b.

L1 x	L2 y
0	-5.2
-8	74.8
24	-245.2
-35	344.8
-5.2	46.8

2a. $w = 15.8$°F

2b. $w = 15$°F

2c. The wind chill temperature changes by 1.4° for each 1° change in actual temperature.

2d. If the actual temperature is 0°F, the wind chill temperature is -29°F.

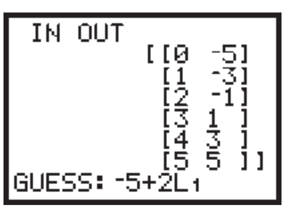
3a. The rate is negative, so the line goes from the upper left to the lower right.

3b. The rate is neither negative nor positive but zero. The line is a horizontal line.

3c. The rate is positive, so the line goes from the lower left to the upper right.

3d. The rate for the speedier walker will be greater than the rate for the person walking more slowly, so the graph for the speedier walker will be steeper than the graph for the slower walker.

4. A sample:



5a. **i.** 3.5; **ii.** 8; **iii.** -1.4

5b. **i.** -6; **ii.** 1; **iii.** 23; the y-intercept

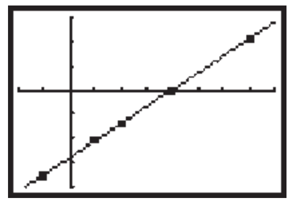
5c. **i.** $y = -6 + 3.5x$; **ii.** $y = 1 + 8x$; **iii.** $y = 23 - 1.4x$

6a. The input variable x is the temperature in °F, and the output variable y is the wind chill in °F.

6b. The rate of change is 1.4°. For every 10° increase in temperature, there is a 14° increase in wind chill.

6c. $y = -28 + 1.4x$

6d. Both graphs show linear relationships with identical rates of change and y-intercepts. The graphs are different in that the points are discrete and the equation continuous.



$[-10, 40, 5, -40, 30, 10]$

7a. *distance from sensor* $= 3.5 - 0.25 \cdot$ *time*

7b. 14 s after she begins walking

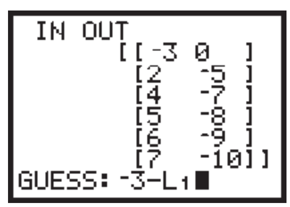
8. Because height times width gives area, 7.3 and x represent the height and width, respectively. The number 200 represents the area of the rectangle in square units. The solution is about 27.4 units. The rectangle is not drawn to scale. The length should be about 3.8 times the width.

9a. 990 square units

9b. possible answers: $33x = 990$; $x = \frac{990}{33}$

9c. 30 units

10. A sample:



11a.

-15	-15
Ans + 52	37
Ans/1.6	23.125
$-52 + 1.6(23.125) = -15$	Check.

11b.

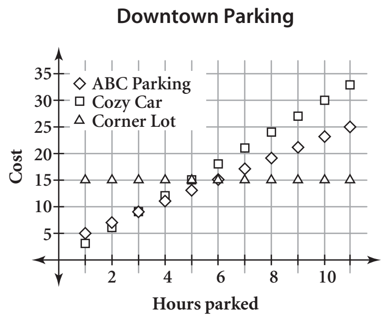
52	52
Ans $-$ 7	45
Ans/-3	-15
$7 - 3(-15) = 52$	Check.

12a.

Hours	ABC	Cozy	Corner
1	5	3	15
2	7	6	15
3	9	9	15
4	11	12	15
5	13	15	15
6	15	18	15
7	17	21	15
8	19	24	15
9	21	27	15
10	23	30	15

ABC: {1,5}, {Ans(1) + 1, Ans(2) + 2};
Cozy: {1,3}, {Ans(1) + 1, Ans(2) + 3};
Corner: {1,15}, {Ans(1) + 1, Ans(2) + 0}

12b.



12c. For less than 3 h, Cozy Car is the least expensive option because on the graph its points are lower than the points of the others. For exactly 3 h, ABC and Cozy Car cost the same. For 3 to 5 h, ABC Parking has the best price, because its graph has a lower cost in that time frame. For exactly 6 h, ABC and The Corner Lot cost the same. For more than 6 h, The Corner Lot is the least expensive option.

12d. No; because you have to pay for a whole hour for any fraction of the hour, the price of parking does not increase continuously.

13a. 70.4 lengths

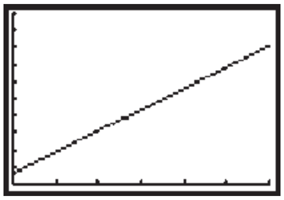
13b. 2.2 ft/s

13c. about 44 lengths

13d. 40 lengths for a kilometer; about 64 lengths for a mile

14a. $y = 6 + 1.25x$

14b.



[0, 60, 10, 0, 100, 10]

14c. 44 movies

Answers to All Exercises

LESSON 3.6

1a. $2x = 6$

1b. $x + 2 = 5$

1c. $2x - 1 = 3$

1d. $2 = 2x - 3$

2. See below.

3a.

3a.	$0.1x + 12 = 2.2$	Original equation.
	$0.1x + 12 - 12 = 2.2 - 12$	Subtract 12 from both sides.
	$0.1x = -9.8$	Remove the 0 and subtract.
	$x = -98$	Divide both sides by 0.1.

3b.	$\dfrac{12 + 3.12x}{3} = -100$	Original equation.
	$12 + 3.12x = -300$	Multiply both sides by 3.
	$12 - 12 + 3.12x = -300 - 12$	Subtract 12 from both sides.
	$3.12x = -312$	Remove the 0.
	$x = -100$	Divide both sides by 3.12

4. See bottom of next page.

5a. $-\frac{1}{5}$

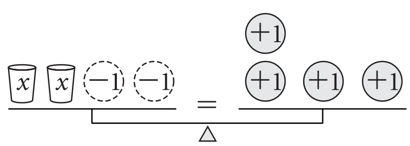
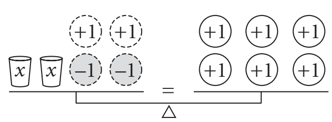
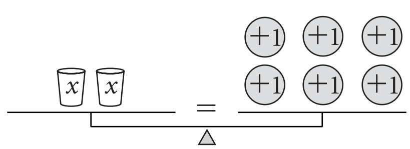
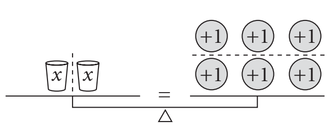
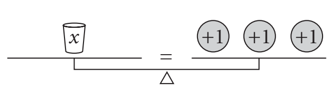
5b. -17

5c. 2.3

5d. x

---

2. (*Lesson 3.6*)

Picture	Action taken	Equation
	Original equation.	$2x - 2 = 4$
	Add 2 to both sides.	$2x - 2 + 2 = 4 + 2$
	Remove 0 from left side.	$2x = 6$
	Divide both sides by 2.	$\frac{2x}{2} = \frac{6}{2}$
	Reduce.	$x = 3$

6a. $\frac{1}{12}$

6b. 6

6c. 50

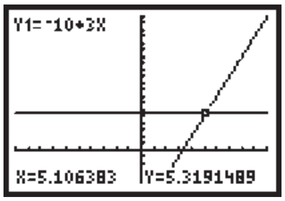
6d. -2

7a. $x = \frac{1}{12}$

7b. $x = 36$

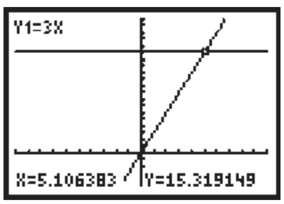
8a. Add 10 to both sides, divide both sides by 3.

8b. (5, 5)

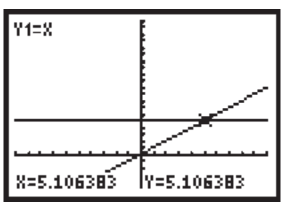


$[-10, 10, 1, -5, 20, 1]$

8c. (5, 15)



8d. (5, 5)



8e. Even though the lines are different in each graph, in all three graphs the x-coordinate of the intersection is the same: $x = 5$. This illustrates that transforming the equation by doing the same thing to both sides does not change the solution.

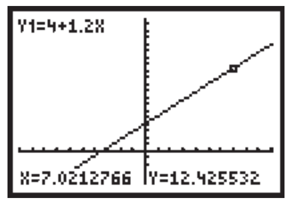
9a.

$4 + 1.2x = 12.4$	Original equation.
$4 - 4 + 1.2x = 12.4 - 4$	Subtract 4 from both sides.
$1.2x = 8.4$	Remove the 0 and subtract.
$\frac{1.2x}{1.2} = \frac{8.4}{1.2}$	Divide both sides by 1.2.
$x = 7$	Reduce.

9b.

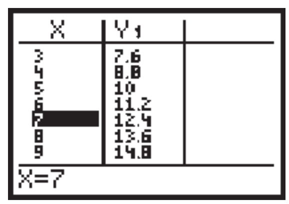
Start with 12.4.	12.4
Ans − 4	8.4
Ans/1.2	7

9c.



$[-10, 10, 1, -5, 20, 1]$

9d.



4a. (*Lesson 3.6*)

Equation: $\frac{3(x-8)}{5} + 7 = 34$			
Description	**Undo**	**Result**	**Equation**
Pick x.		53	$x = 53$
Subtract 8.	$+ (8)$	45	$x - 8 = 45$
Multiply by 3.	$/ (3)$	135	$3(x - 8) = 135$
Divide by 5.	$\cdot (5)$	27	$\frac{3(x-8)}{5} = 27$
Add 7.	$- (7)$	34	$\frac{3(x-8)}{5} + 7 = 34$

4b. (*Lesson 3.6*)

Equation: $7\left(\frac{2+x}{4}\right) - 5 = 16$			
Description	**Undo**	**Result**	**Equation**
Pick x.		10	$x = 10$
Add 2.	$- (2)$	12	$2 + x = 12$
Divide by 4.	$\cdot (4)$	3	$\frac{2+x}{4} = 3$
Multiply by 7.	$/ (7)$	21	$7\left(\frac{2+x}{4}\right) = 21$
Subtract 5.	$+ (5)$	16	$7\left(\frac{2+x}{4}\right) - 5 = 16$

10a.
$$\begin{aligned} 3 + 2x &= 17 \\ 3 - 3 + 2x &= 17 - 3 \\ 2x &= 14 \\ \frac{2x}{2} &= \frac{14}{2} \\ x &= 7 \end{aligned}$$

10b.
$$\begin{aligned} 0.5x + 2.2 &= 101.0 \\ 0.5x + 2.2 - 2.2 &= 101.0 - 2.2 \\ 0.5x &= 98.8 \\ \frac{0.5x}{0.5} &= \frac{98.8}{0.5} \\ x &= 197.6 \end{aligned}$$

10c.
$$\begin{aligned} x + 307.2 &= 2.1 \\ x + 307.2 - 307.2 &= 2.1 - 307.2 \\ x &= -305.1 \end{aligned}$$

10d.
$$\begin{aligned} 2(2x + 2) &= 7 \\ \frac{2(2x + 2)}{2} &= \frac{7}{2} \\ 2x + 2 &= 3.5 \\ 2x + 2 - 2 &= 3.5 - 2 \\ 2x &= 1.5 \\ \frac{2x}{2} &= \frac{1.5}{2} \\ x &= 0.75 \end{aligned}$$

10e.
$$\begin{aligned} \frac{4 + 0.01x}{6.2} - 6.2 &= 0 \\ \frac{4 + 0.01x}{6.2} - 6.2 + 6.2 &= 0 + 6.2 \\ \frac{4 + 0.01x}{6.2} &= 6.2 \\ \frac{4 + 0.01x}{6.2} \cdot 6.2 &= 6.2 \cdot 6.2 \\ 4 + 0.01x &= 38.44 \\ 4 - 4 + 0.01x &= 38.44 - 4 \\ 0.01x &= 34.44 \\ \frac{0.01x}{0.01} &= \frac{34.44}{0.01} \\ x &= 3444 \end{aligned}$$

11a. $r = \frac{C}{2\pi}$

11b. $h = \frac{2A}{b}$

11c. $l = \frac{P}{2} - w$

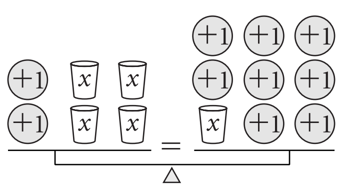
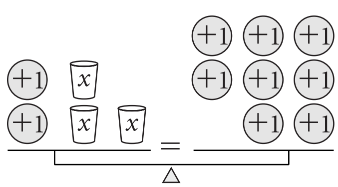
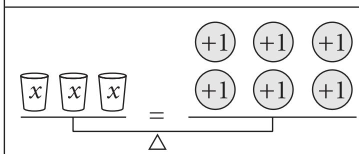
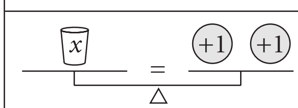
11d. $s = \frac{P}{4}$

11e. $t = \frac{d}{r}$

11f. $h = \frac{2A}{a + b}$

12a. See below.

12a. (*Lesson 3.6*)

Picture	Action taken	Equation
	Original equation.	$2 + 4x = x + 8$
	Subtract $1x$ from both sides.	$2 + 3x = 8$
	Subtract 2 from both sides.	$3x = 6$
	Divide both sides by 3.	$x = 2$

12b.

$$\begin{aligned} 5x - 4 &= 2x + 5 \\ 5x - 2x - 4 &= 2x - 2x + 5 \\ 3x - 4 &= 5 \\ 3x - 4 + 4 &= 5 + 4 \\ 3x &= 9 \\ x &= 3 \end{aligned}$$

Check: $5(3) - 4 \stackrel{?}{=} 2(3) + 5$

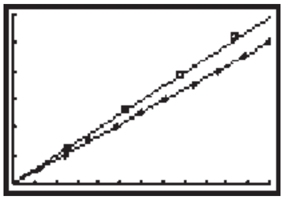
$$15 - 4 \stackrel{?}{=} 6 + 5$$

$$11 = 11$$

13. $\frac{\$90}{2.25} = \frac{x}{3}, x = \$120$

15a. See below.

15b.



$[0, 72, 6, 0, 30, 5]$

The line with the square markers is the bagel store, and the line with the crosses is the grocery store.

15c. y represents cost; x represents number of bagels.
bagel store: $y = \frac{6.49}{13}x$ (or $y \approx 0.50x$)
grocery store: $y = \frac{2.50}{6}x$ (or $y \approx 0.42x$)

15d. Bagel store: about 50¢ per bagel; grocery store: about 42¢ per bagel; these are the coefficients of x or constants of variation in the equations.

15e. the grocery store, because its line is lower

15f. Bernie's routine calculates each price by doubling the last. It works the first time, because if you buy twice as many bagels, you pay twice as much. But using Bernie's routine, if you buy 36 bagels at the bagel store, you pay \$25.96 instead of \$19.47, which amounts to paying four times as much as a single dozen instead of three times the price of a dozen. The routine should be: 6.49 ENTER, Ans + 6.49, ENTER, ENTER, ...

15a. (*Lesson 3.6*)

Bagel Store

Bagels	13	26	39	52	65	78
Cost	6.49	12.98	19.47	25.96	32.45	38.94

Grocery Store

Bagels	6	12	18	24	30	36	42	48	54	60
Cost	2.50	5.00	7.50	10.00	12.50	15.00	17.50	20.00	22.50	25.00

CHAPTER 3 REVIEW

1a. $x = -7$

1b. $x = -23.4$

2a. 1; 3; add 1; $y = 3 + x$

2b. 0.01; 0; add 0.01; $y = 0.01x$

2c. 2; 5; add 2; $y = 5 + 2x$

2d. $-\frac{1}{2}$; 3; subtract $\frac{1}{2}$; $y = 3 - \frac{1}{2}x$

3a. iii

3b. i

3c. ii

4a. $y = -68.99$

4b. $y = 4289.83$

4c. $y = 0.14032$

4d. $y = 238{,}723$

5a. $y = x$

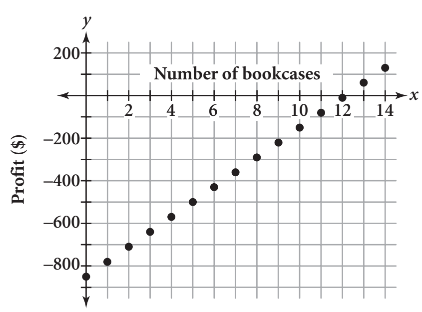
5b. $y = -3 + x$

5c. $y = -4.3 + 2.3x$

5d. $y = 1$

6a. 0 represents no bookcases sold; -850 represents fixed overhead, such as start-up costs; Ans(1) represents the previously calculated number of bookcases sold; Ans(1) + 1 represents the current number of bookcases sold, one more than the previous; Ans(2) represents the profit for the previous number of bookcases; Ans(2) + 70 represents the profit for the current number of bookcases—the company makes \$70 more profit for each additional bookcase sold.

6b.



6c. Sample answer: The graph crosses the x-axis at approximately 12.1 and is positive after that; the company needs to make at least 13 bookcases to make a profit.

6d. -850, the profit if the company makes zero bookcases, is the y-intercept; 70, the amount of additional profit for each additional bookcase, is the rate of change; y goes up by \$70 each time x goes up by one bookcase.

6e. No; partial bookcases cannot be sold.

7a. 3

7b.

Number of sections	1	2	3	4	...	30	...	50
Number of logs	4	7	10	13	...	91	...	151

7c. 4 ENTER, Ans + 3 ENTER, ENTER, . . .

7d. 216 m

8a. Let v represent the value in dollars and y represent the number of years; $v = 5400 - 525y$.

8b. The rate of change is -525; in each additional year, the value of the computer system decreases by \$525.

8c. The y-intercept is 5400; the original value of the computer system is \$5,400.

8d. The x-intercept is approximately 10.3; this means that the computer system no longer has value after approximately 10.3 yr.

9a. $50 = 7.7t$

$$t = \frac{50}{7.7} \approx 6.5 \text{ s}$$

9b. $50 = 5 + 6.5t$

$$t = \frac{50 - 5}{6.5} \approx 6.9 \text{ s}$$

9c. Andrei wins; when Andrei finishes, his younger brother is $50 - [5 + 6.5(6.5)] \approx 2.8$ m from the finish line.

10a. $x = 4.5$

10b. $x = -4.1\overline{3}$

10c. $x = 0.\overline{6}$

10d. $x = 12.8$

10e. $x = 6.\overline{3}$

11a. $L_2 = -5.7 + 2.3 \cdot L_1$

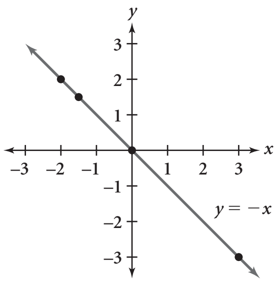
11b. $L_2 = -5 - 8 \cdot L_1$

11c. $L_2 = 12 + 0.5 \cdot L_1$

12a. $y = 1 + \frac{1}{2}x$; the output value is half the input value plus 1.

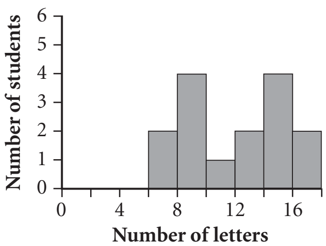
x	y
0	1
1	1.5
2	2
3	2.5
4	3

12b. $y = -x$; the output value is the additive inverse (or opposite) of the input value, or the sum of the input value and the output value is 0.



13. No, they won't fit; 210 cm is 6.89 ft.

14a. Name Length



14b. 11.6 letters

15a. -54

15b. 5

15c. 8

15d. -18

16a. The starting value is 12; Ans + 55.

Possible assumptions: Tom's home is 12 mi closer to Detroit than to Traverse City. He travels at a constant speed. We are measuring highway distance.

16b.

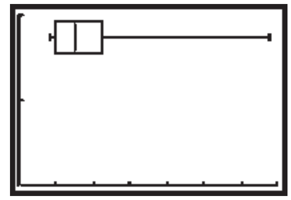
Hours	0	1	2	3	4	5
Distance (mi)	12	67	122	177	232	287

16c. Tom traveled 55 mi each additional hour. The rate of change is 55 mi/h.

17a. approximately 1061 thousand (or 1,061,000) visitors

17b. 404, 482, 738, 1131, 3379

17c.



[0, 3500, 500, 0, 2, 1]

17d. Yosemite; the number of visitors exceeds 1131 by more than $1.5(1131 - 482)$.

18a. 9 amperes

18b. 6 ohms

19a. Solution methods will vary; $x = 3.5$.

19b. $2(3.5 - 6) = 2(-2.5) = -5$

20a. $\frac{500}{6} \approx 83.3$ h

20b. $\frac{500}{0.75 \cdot 6} \approx 111.1$ h